SPECIES HABITS OBSERVATION USING ACOUSTIC TECHNIQUES

David Sarriá[1], Antoni Mànuel[1], Joaquín del Río[1], Erik Molino[1], Francesc Sardà[2], Jacopo Aguzzi[2], Guiomar Rotllant[3]
1-SARTI Research Group. Universitat Politècnica de Catalunya (UPC) www.cdsarti.org
2-Institut de Ciències del Mar (CMIMA-CSIC)
3-Institut de Rercerca i Tecnologia Agroalimentàries (IRTA)

The aim of this project is to implement a system to monitor marine species using underwater acoustic technologies. The system is composed by coded transmitters which send data to different hydrophones installed in the seabed. The data stored by the different hydrophones is collected and analyzed after the experiments. A correct design and techniques of synchronization are taken into account to perform the tracking of the specie as a final purpose.
Nowadays, due to overexploitation of marine species, there is the need to increase the information available on the biology of some exploited species. The development of wireless communication systems and the increasing possibility of miniaturization of sensors, storage and data processing devices, have opened a door to a new generation of distributed smart sensor networks, spatially or geographically in the environment and connected by a communication network. The system we are proposing is composed by different transmitters (transponders), one for each individual, and five autonomous hydrophones located in artificial reefs near the coast, Figure 1.
The transmitter under consideration is the Vemco V6, which operates at 180 kHz, which operates well in both fresh and salt water. An interesting feature of this device is its size and weight (6mm diameter and 0.5 grams in water) and the possibility to program easily the latency of emitting, which can be changed from some seconds to minutes. This feature permits to extend the autonomy of the transmitter when the experiment requires long period of time (up to one year sending pings every four minutes).
The data transmitted will be processed by different hydrophones and stored with a time-stamp. With a known and accurate location of the five hydrophones, and a good synchronization between them, it is possible to achive the tracking of the specie using the acoustic triangulation technique [2]; to calculate the uncertenly range of tracking, different pingers will be located in known positions in order to correct the clock drift between hydrophones and also other problems in the field.
Actually, the project is under development, and some tests are currently in progress: reflections in closed spaces, interferences, downloading data from the hydrophone in water and so on. In parallel are being studied new materials to attach the transmitter to small species with shell, and some tries are made to avoid losing of the transmitter if the specie sheds.
In the next steps the hydrophones will be installed in the different reefs near Sant Carles de la Ràpita, Catalonia, and some experiments will be performed with juvenile European spider crabs Maja squinado.

References

[1] Moore, Richard R, Radio Communications in the See, IEEE Spectrum, Vol. 4, Nov 1967
[2] Dale Webber, Acoustic Telemetry New User Guide, Vemco – Education. Vemco, 2009

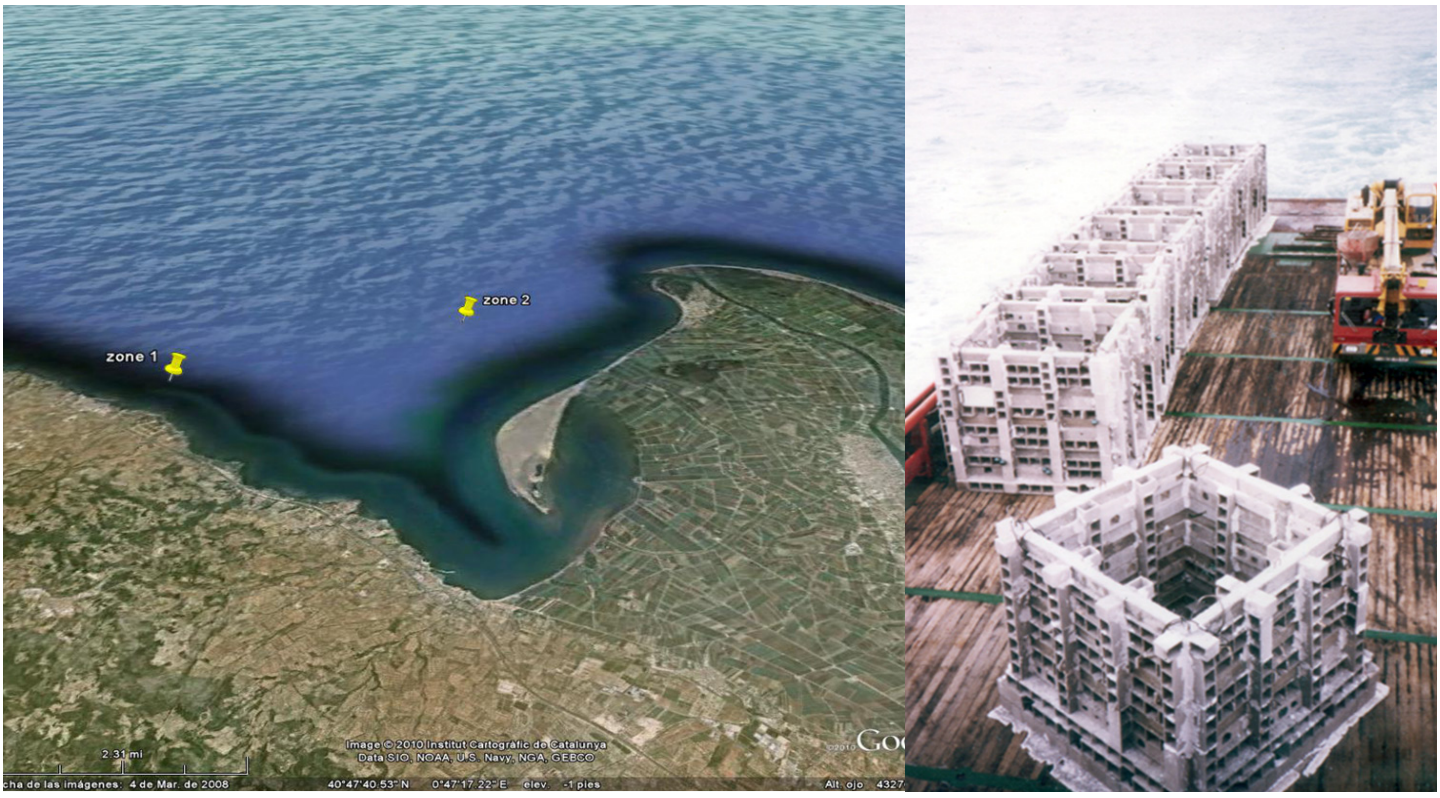

Figure 1 Artificial reefs and location in the area of study